



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,051	01/14/2004	Juergen S. Schoen	584-23131-USD	4819

24923 7590 09/21/2005
PAUL S MADAN
MADAN, MOSSMAN & SRIRAM, PC
2603 AUGUSTA, SUITE 700
HOUSTON, TX 77057-1130

EXAMINER

FETZNER, TIFFANY A

ART UNIT PAPER NUMBER

2859

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/757,051

Applicant(s)

SCHOEN ET AL.

Examiner

Tiffany A. Fetzner

Art Unit

2859

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-23, 25-28, 30, 32-34, and 37 is/are rejected.
- 7) ☒ Claim(s) 24, 29, 31, 35, 36 and 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED Third non-final ACTION

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The drawings filed 01/14/2004 which now are part of applicant's instant application's official file record resolve the drawing concerns of the April 6th 2005 Office action. The examiner notes that prior to official entry only the drawings from the original parent application were viewable to the examiner. Currently there are no examiner objections to the drawings filed January 14th 2004.

Response to Arguments

4. Applicant's arguments filed 06/30/2005 have been fully considered but they are not persuasive.

5. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies from applicant's remarks on page 8 of the June 30th 2005 response in the "claim 21" paragraph (i.e., deriving horizontal and vertical permeabilities **from** horizontal and vertical resistivities) is not recited in the rejected claim(s).

6. **Claim 21 limitation a)** is recited as "obtaining values" (i.e. plural) of **a** (i.e. singular) "horizontal and vertical resistivity (i.e. singular/single combined resistivity value, **or** an initial single value for the horizontal resistivity, in combination with an initial single value of vertical resistivity) "of said earth formation using said logging tool; and"

The limitation which is actually recited in **claim 21 limitation b)** is "determining a horizontal and vertical 'permeability'" (i.e. a single combined permeability value, **or** an initial single value for the horizontal permeability, in combination with an initial single value of vertical permeability) "of said earth formation 'using' said horizontal and vertical resistivities" (i.e. more than one resistivity), "said horizontal and vertical 'permeabilities'" (i.e. more than one permeability) "having a ratio different from a ratio of said vertical and horizontal resistivities." (i.e. more than one resistivity). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

7. Additionally **claim 21** limitation a) requires "obtaining values of a horizontal and vertical resistivity" this limitation is met broadly by a plurality of values obtained from an initial of single resistivity log measurement of/representing vertical and horizontal resistivity, which is argued by applicant to be what is shown by the **Klein** reference on page 7 of the June 30th 20005 response.

8. While, the examiner agrees that the **Klein** reference does derive multiple parallel (i.e. horizontal) and perpendicular (i.e. perpendicular) permeability measurements from the single resistivity log of figure 6. [See the applicant's arguments on pages 7-6 of the June 30th 2005 response.] The examiner notes that **applicant's claim 21** as currently recited, does not support applicant's argument because there is an ambiguous question raised as to whether the scope of the claim applies to either singular or plural measurements; or whether a single value, or multiple individual values, are required for separate horizontal and vertical measurements, therefore the arguments presented are not persuasive.

9. The examiner also notes that "determining" via "using" is not equivalent to "determining from" because "determining" via "using" implies that a specific component is "part of" a calculation for a specified limitation, while "determining from" implies that the value of the specific component, is directly related to the value of the specified limitation, without additional components added into the determining calculation. (i.e. "determining from" is closed ended while "determining ... using" is open ended. This is

Art Unit: 2859

similar to the difference between use of the word “comprising” which is open ended and “consisting of” which is closed ended.

10. Because applicant's arguments are not persuasive. The rejections concerning the **Klein** reference from the April 6th 2005 Office action are maintained.

11. An updated prior art search concerning the argued limitation of determining horizontal and vertical permeabilities from multiple horizontal and vertical resistivity values also brought US patent 5,463,549 issued to **Dussan V. et al.**, to the examiner's attention. **Dussan V. et al.**, determines horizontal and vertical permeabilities from multiple radial resistivity measurements (i.e. horizontal/vertical resistivity depending on the frame of reference), which are performed at different resistivity depths. [See the entire **Dussan V. et al.**, reference] The **Dussan V. et al.**, reference is noted as being potentially applicable to the argued but not presently claimed terminology of applicant in the June 30th 2005 response.

12. Because the examiner is citing an additional prior art reference, which may be applicable to currently unclaimed limitations argued in the June 30th 2005 response, the following rejections are non-final.

13. Additionally, in view of applicant's arguments concerning the **103 rejection of claim 28** with respect to the combination of **Klein**, and **Hagiwara**, in the June 30th 2005 amendment and response on **page 9**, the **rejection of claim 28** for that **combination of prior art** is also **rescinded**.

14. **Claim 27** remains rejected because the novelty recited in the claim is “a transverse induction logging tool” not whether there is a single logging tool or multiple logging tools present. Also contrary to applicant's arguments on page 9 of the June 30th 2005 response **Hagiwara**, does teach more than 1 induction tool within the disclosure of the **Hagiwara**, reference. Clarified citations are recited in the combinational **103 rejection of claim 27** with respect to the combination of **Klein**, and **Hagiwara**.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2859

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. **Claims 21, 22, 23, 25, 26, and 30** are still rejected under **35 U.S.C. 102(b)** as being anticipated by the article "The Petrophysics of Electrically Anisotropic Reservoirs; by J.D. **Klein**, P.R. Martin, and D.F. Alen; from The Log Analyst, May-June 1997, pages 25-36. [Hereafter **Klein et al.**,]

17. With respect to **Claim 21**, the **Klein et al.**, article teaches "A method of petrophysical evaluation of an earth formation using a logging tool conveyed in a borehole" [See page 36 last paragraph where the techniques are applied only to LWD (logging while drilling "of an earth formation" which requires "using a logging tool conveyed in a borehole in said formation," as the well is being drilled) resistivity data obtained in very highly deviated wells (i.e. (>70 degrees) but teaches that both perpendicular and parallel resistivity in vertical wells will be usable in the industry in future developments. See also pages 25 through 36, which explain multiple "methods of petrophysical evaluation of an earth formation using a logging tool conveyed in a borehole in said formation".] The **Klein et al.**, article also teaches that "the method comprises "(a) obtaining values of a horizontal and vertical resistivity of said earth formation using said logging tool;" [See page 25 col. 1 last paragraph through page 35 col. 2 second to last paragraph; equations 1 through 14 which use horizontal and vertical resistivity as parameters; figures 2 through 16] "and (b) determining a horizontal and vertical permeability of said earth formation using said horizontal and vertical resistivities" [See figures 7 through 13, equations 8 through 14 and the teachings of pages 25 through 36] "said horizontal and vertical permeabilities having a ratio different from a ratio of said vertical and horizontal resistivities" [See figures 7 through 11 which show the parallel and vertical resistivities and permeabilities with the resistivity ratio plotted out and from the ratio plot it is clear that the resistivity ratio is different than both the horizontal and vertical permeability..

18. With respect to **Claim 22**, The **Klein et al.**, article also teaches that "said earth formation comprises a sand component and a shale component." [See figure 16; page 25 col. 2 paragraph 2 where formation laminated sands and shales are taught to vary

with fluid saturation. See also the entire text of the article in general and figures 1 through 16 which show plots containing sand or shale components.] The same reasons for rejection, that apply to **claim 21** also apply to **claim 22** and need not be reiterated.

23. With respect to **Claim 23**, The **Klein et al.**, article also teaches that "determining said horizontal and vertical permeabilities further comprises determining a water content of said formation from said horizontal and vertical resistivities." [See pages 25 through 36; equations 1 through 14, especially page 33 col. 2 through page 35 col. 2 second to last paragraph.] The same reasons for rejection, that apply to **claim 21** also apply to **claim 23** and need not be reiterated.

19. With respect to **Claim 25**, The **Klein et al.**, article also teaches "determining said water content of said formation further comprises: "(i) inverting said values of horizontal and vertical resistivities of the formation" is taught by the reference because conductivity is obtained "using a petrophysical model to give a first estimate of fractional volume of laminated shale in the formation;" [See figure 5, and page 29 where conductivity is used to obtain the shale volume of each layer, along with equation 2 which shows the inverse of resistivity, (i.e. conductivity) being used to obtain the volume fraction of a layer of the earth formation on page 26.] **Klein et al.**, article also teaches "(ii) obtaining measurements of density **and/or** neutron porosity of the formation and using a volumetric model for deriving therefrom a second estimate of fractional volume of laminated shale;" [See equations 4, 5, 6, 7, 8, 10, and 14 and figures 4 through 11, pages 25 through 36.] "(iii) inverting said horizontal and vertical resistivities using a petrophysical model including said second estimate of fractional shale volume and obtaining therefrom a water content of the formation," is taught by the **Klein et al.**, article because more than one measurement of the fractional shale volume is made. [See the text of pages 25 through 36, equations 1 through 14 and figures 1-16 which explain the various models and measurements in general.] The same reasons for rejection, that apply to **claims 21**, and **23** also apply to **claim 25** and need not be reiterated.

20. With respect to **Claim 26**, The **Klein et al.**, article also teaches "determining a vertical and horizontal resistivity of an anisotropic sand component of the formation"

[See the entire **Klein et al.**, article], "and determining therefrom and from at least **one additional** measurement selected from the group consisting of: (i) NMR measurements of the formation, and, (ii) a bulk permeability of the sand component" [See equations 7 through 14 pages 31 through 36 where permeability / bulk permeability k_o of a sand component is determined from, "a parameter of interest of a coarse and a fine grain portion of the sand component" [See page 25 col.2; which suggests use with coarse and fine grain sand, page 31 col. 2; page 32, page 33 and page 35 which determine "a bulk permeability of the sand component", and also see page 30 col. 2 last paragraph where coarse grain sand is taught. The same reasons for rejection, that apply to **claim 21**, also apply to **claim 26** and need not be reiterated.

21. With respect to **Claim 30**, The **Klein et al.**, article also teaches "determining a parameter of interest **selected from the group consisting of**: (A) a fractional volume of said coarse grain component, (B) a fractional volume of said fine grain component, (C) a water saturation of said coarse grain component, (D) a water saturation of said fine grain component, (E) a permeability of said coarse grain component, and, (F) a permeability of said fine grain component." [See pages 25 through 36, where water saturation, fractional volumes, permeability and coarse or even (i.e. fine) sand / shale components / volumes are considered as parameters throughout the reference. **Klein et al.**, considers fine and coarse grains, volume, water saturation, and permeability. [See the entire **Klein et al.**, article for the specific calculations]. The examiner notes that applicant's claim only requires a selection of one of these components, but the reference considers the impact of the multiple components and therefore meets the limitation set forth by this claim. The same reasons for rejection, that apply to **claim 21**, also apply to **claim 30** and need not be reiterated.

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2859

23. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

24. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

25. **Claims 27, 28, 32, 33, 34 and 37** are still rejected under **35 U.S.C. 103(a)** as being unpatentable over of the article "The Petrophysics of Electrically Anisotropic Reservoirs; by J.D. **Klein**, P.R. Martin, and D.F. Alen; from The Log Analyst, May-June 1997, pages 25-36. [Hereafter **Klein et al.**,]

26. With respect to **Claim 27**, the **Klein et al.**, article lacks directly teaching "using a transverse induction logging tool for obtaining said values of horizontal and vertical resistivities of the formation." However, the **Klein et al.**, article does teach use of a LWD tool [See page 36] to perform the methods of the **Klein et al.**, article and It would have been obvious to one of ordinary skill in the art at the time that the invention was made that a conventional logging while drilling device which acquires transverse / perpendicular resistivity as well as parallel longitudinal resistivity is a "transverse" logging induction tool. [See **Klein et al.**, page 25 col. 2 last full paragraph.] The same reasons for rejection, that apply to **claim 21** also apply to **claim 27** and need not be reiterated.

27. With respect to **Claim 28**, the **Klein et al.**, article lacks directly teaching "using an

induction logging tool for obtaining said values of horizontal resistivities and a focused current logging tool for obtaining said values of vertical resistivities” However, the **Klein et al.**, article teaches using a logging while drilling (LWD) induction tool, [See page 36] “for obtaining said values of horizontal resistivities” [See page 36 in the context of the teachings of pages 25 through 36] Additionally, the **Klein et al.**, article also teaches that the LWD logging tool in anisotropic formations depend on the direction of the current and the fluid flow relative to the bedding. [See page 31 col. 2] It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the ability of the tool to control the direction of the current, suggests that the LWD tool is also a focused current logging tool, since maintaining current in a specific direction requires focusing current. The same reasons for rejection, that apply to **claim 21** also apply to **claim 28** and need not be reiterated.

28. With respect to **Claim 32**, the **Klein et al.**, article lacks directly teaching a statement that “the at least one additional measurement comprises a bulk permeability measurement of the anisotropic sand and deriving the parameter of interest further comprises: **A)** obtaining a family of possible distributions of volume fractions and bulk irreducible water content (BVI) for the coarse and fine sand components; **B)** determining horizontal, vertical and bulk permeability values associated with said family of possible distributions; and **C)** selecting from said family of possible distributions the one distribution that has a determined bulk permeability substantially equal to the measured bulk permeability.” However, the **Klein et al.**, article shows from figures 4 through 16 the feature of “**A)** obtaining a family of possible distributions of volume fractions and bulk irreducible water content (BVI) for the coarse and fine sand components;” the **Klein et al.**, article also suggests from equations 1 through 14 and the text of pages 25 through 36 the limitation of “**B)** determining horizontal, vertical and bulk permeability values associated with said family of possible distributions;”. Additionally, It would have been obvious to one of ordinary skill in the art at the time that the invention was made that based on the predicted permeability figures 12 and 13 of page 34, that the **Klein et al.**, article also suggests the feature of “**C)** selecting from said family of possible distributions the one distribution that has a determined bulk permeability substantially

equal to the measured bulk permeability." Therefore, even though these steps are not explicitly stated by the reference they are suggested by what is taught and shown within the **Klein et al.**, article. The same reasons for rejection, that apply to **claims 21 and 26** also apply to **claim 32** and need not be reiterated.

29. With respect to **Claim 33**, the **Klein et al.**, article teaches that "said bulk permeability" (i.e. k_o) "is obtained from the group consisting of (II) a formation testing instrument" (i.e. the Logging while drilling device of page 36), and suggests either limitation "(III) a pressure buildup test, and, (IV) a pressure drawdown test" from the capillary pressure data of figure 1 and pages 25 through 27, therefore the **Klein et al.**, article teaches "said bulk permeability is obtained from the group consisting of (1) NMR diffusion measurements, (II) a formation testing instrument, (III) a pressure buildup test, and, (IV) a pressure drawdown test." The same reasons for rejection, and obviousness that apply to **claims 21, 26 and 32** also apply to **claim 33** and need not be reiterated.

30. With respect to **Claim 34**, the **Klein et al.**, article suggests from equation 7 on page 31, "that determining the horizontal and vertical permeability values associated with said family of distributions for the coarse and fine sand components further comprises using the Coates-Timur equation : $K'[(\phi/C)^a] * [(\phi-BVI)/BVI]^b$ where K is a permeability, ϕ is a porosity, BVI is the bound volume irreducible, and a , b , and C are fitting parameters." [See **Klein et al.**, equation 7 on page 31 which is considered to be the same mathematically equivalent equation, as the equation claimed by applicant, and the entire **Klein et al.**, article, pages 25-36, and Figures 1-16 in general] The same reasons for rejection, and obviousness, that apply to **claims 21, 26, and 32** also apply to **claim 34** and need not be reiterated.

31. With respect to **Claim 37**, the **Klein et al.**, article teaches and suggests that "the coarse sand portion of the selected distribution is characterized by an irreducible water saturation less than an irreducible water saturation of the fine grain sand portion of the selected distribution. [See page 25 col. 2, page 26, page 27, page 33, page 34 and page 35.] The same reasons for rejection, and obviousness, that apply to **claims 21, 26, and 32** also apply to **claim 37** and need not be reiterated.

32. **Claim 27**, is also still rejected under **35 U.S.C. 103(a)** as being unpatentable

Art Unit: 2859

over the article "The Petrophysics of Electrically Anisotropic Reservoirs; by J.D. **Klein**, P.R. Martin, and D.F. Alen; from The Log Analyst, May-June 1997, pages 25-36.

[Hereafter **Klein et al.**]; in further view of **Hagiwara** US patent 5,966,013 issued October 12th 1999; filed June 12th 1996.

33. With respect to **Claim 27**, **Klein et al.**, lacks directly teaching "using a transverse induction logging tool for obtaining said values of horizontal and vertical resistivities of the formation". However, **Hagiwara** teaches obtaining values of horizontal and vertical resistivities with a transverse induction-logging tool. [See col. 3 lines 16-40 where the ability to conduct horizontal and vertical resistivity measurements is taught'; col. 6 lines 32-37 where an exemplary Compensated Wave Resistivity (CWR) Induction type logging tool induction tools is taught; and col. 9 line 10 through col. 10 line 47 where a logging while drilling or (LWD) induction type logging tool is taught which suggests that at least two types of logging induction tools are useful with the **Hagiwara** reference. The examiner notes that Figures 1 through 11B, which show the arrangement of the induction tool and the detected signals, are directly suggestive of transverse signal detection. The teachings of **Hagiwara** can be combined with the teachings of **Klein et al.**, because **Hagiwara** considers formation anisotropy and provides the same supportive feature of vertical and horizontal resistivities as taught by **Klein et al.** The **Klein et al.**, reference lacks teaching the specific types of tools used to make the resistivity measurements, **Klein et al.**, simply specifies that the measurements are made by a logging while drilling device [See page 36], however, the **Hagiwara** reference is combined with **Klein et al.**, reference to show that the use of induction LWD well-logging tools for this measurement is well-known. Therefore, the same reasons for rejection, that apply to **claim 21** also apply to **claim 27**.

Allowable Subject Matter

34. **Claims 24, 29, 31, 35, 36, and 38** are still objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The **prior art of record** does not teach the combination of **claims 21, 23** with the combinational limitation including the step of "determining said horizontal and vertical permeabilities further

Art Unit: 2859

comprises determining an estimate of bulk irreducible water content of the formation from NMR measurements" (i.e. **claim 24**), or the step of "using said volumetric model further comprises using at least one of: (i) the Thomas-Stieber model, and, (ii) the Waxman-Smits model" in combination with all of the other claim features of **claim 25** from which **claim 29** depends.

35. The **prior art of record** also does not teach the combination of **claim 31**, (i.e. "the method of **claim 26** wherein the at least one additional measurement comprises an NMR measurement, and deriving the parameter of interest further comprises deriving a distribution of relaxation times from said NMR measurements and obtaining therefrom a distribution of components of said anisotropic sand") in combination with all of the other claim features of **claim 26** from which **claim 31** depends. Additionally, the **prior art of record** also does not teach the combination of **claim 35**, (i.e. "determining horizontal, vertical and bulk permeability values further comprises using a relationship of the form $K = C\phi^a T^b$ where K is a permeability, ϕ is a porosity and T is a NMR relaxation time, and a , b , and C are fitting parameters"), in combination with all of the other claim features of **claims 32, 26, and 21** from which **claim 29** depends; or **claim 36**, (i.e., the method of **claim 35** wherein T is a longitudinal NMR relaxation time) which necessarily depends from **claim 35** and requires the NMR measurement in combination with each of the other features of **claims 35, 32, 26, and 21** from which **claim 36** depends.

36. Lastly, with respect to **Claim 38**, the **prior art of record** also does not teach the combination of **claim 38**, (i.e. that "the determined bulk permeability is a spherical permeability related to the horizontal and vertical permeability values by a relationship of the form $K_{sph}[(K_h^2 K_v)^{(1/3)}]$."

Prior Art of Record

37. The **prior art made of record** and not relied upon is considered pertinent to applicant's disclosure.

A) **Day et al.**, US patent 6,255,819 B1 issued July 3rd 2001, filed October 25th 1999.

B) **Tutunji et al.**, US patent 6,337,568 B1 issued January 2002, filed April 7th 2000, the **Tutunji et al.**, patent is a continuation in part of **Day et al.**, US patent 6,255,819 B1.


Art Unit: 2859

- C) **Freedman et al.**, US patent 6,032,101 issued February 29th 2000.
- D) **Schoen et al.**, US patent 6,686,736 B2 issued Feb. 3rd 2004 which is the issued patent of applicant's parent application, and therefore not available as prior art against the claims of the instant application.
- E) **Schoen et al.**, US patent application publication 2001/0101235 A1 published August 1st 2002 which corresponds to the originally filed US application which became US patent 6,686,736 B2 issued Feb. 3rd 2004, the issued patent of applicant's parent application, that is not available as prior art against the claims of the instant application.
- F) **Schoen et al.**, US patent application publication 2004/0140801 A1 published July 22nd 2004, which corresponds to applicant's instant application, and is therefore not available as prior art against the claims of the instant application.
- G) **Vinegar et al.**, US patent 4,719,423 issued January 12th 1988
- H) **Runge** US patent 3,479,581 issued November 18th 1969.
- I) ***Dussan V. et al.**, US patent 5,463,549 issued October 31st 1995. Applicant should review this reference thoroughly before replying to this action, as it is potentially applicable to the currently argued, by non-recited claim limitations, of applicant's **independent claim 21**.

Conclusion

38. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

39. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is (571) 273-8300.



TAF

September 19, 2005



Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800